

General

Title

Pneumonia: hospital-level, risk-standardized payment associated with a 30-day episode of care for pneumonia.

Source(s)

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 measure updates and specifications report: hospital-level risk-standardized payment measures. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017 Mar. 94 p.

Measure Domain

Primary Measure Domain

Related Health Care Delivery Measures: Cost

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure estimates hospital-level, risk-standardized payment (RSP) for a pneumonia episode of care starting with inpatient admission to a short term acute-care hospital and extending 30 days post-admission for Medicare Fee-for-Service (FFS) patients discharged from the hospital with either a principal discharge diagnosis of pneumonia or a principal discharge diagnosis of sepsis (not including severe sepsis) that have a secondary discharge diagnosis of pneumonia coded as a present on admission (POA) and no secondary diagnosis of severe sepsis coded as POA.

The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for individuals who are 65 years and older and are Medicare Fee-for-Service (FFS) beneficiaries hospitalized in non-federal short-term acute care hospitals (including Indian Health Services hospitals) and critical access hospitals.

Rationale

In 2012 total Medicare expenditures were \$574.2 billion, representing 3.6% of gross domestic product (GDP). Current estimates suggest that Medicare spending will increase to 5.6% of GDP by 2035 due to both an increase in the Medicare population as well as Medicare spending on each beneficiary (The Boards of Trustees, Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds, 2013). The growth in Medicare spending is unsustainable and highlights the need to create incentives for high value care. A critical first step in moving toward high value care is to define an approach to calculate costs that is transparent to consumers and fair to providers. This measure, using standardized payments, reflects differences in the management of care for patients with pneumonia both during hospitalization and immediately post-discharge.

Payments, however, are difficult to interpret in isolation. Some high payment hospitals may have better clinical outcomes when compared with low payment hospitals; other high payment hospitals may not. In an effort to identify practice patterns that may be expensive without conferring a quality benefit, the pneumonia payment measure specifications are aligned with current quality of care measures such as Centers for Medicare & Medicaid Services' (CMS's) 30-day pneumonia risk-standardized mortality rate (RSMR). In this way the measure can facilitate the profiling of hospital value and encourage the most efficient delivery of high quality care.

A payment measure that fairly profiles hospitals by adjusting for hospital case-mix and standardizes payments for geography is congruent with national efforts to increase the transparency of our healthcare system. Although the pneumonia payment measure is not intended to be used in payment programs, when interpreted in the context of CMS's 30-day pneumonia RSMR, it can provide key insights into those systems of care that provide high value as a patient moves from the inpatient to the outpatient setting. Because the payment measure spans an episode of care, it is complementary to and may uniquely inform innovative payment models such as bundled payments and Accountable Care Organizations (ACOs), both of which seek to improve healthcare value by optimizing the coordination of care across care settings (CMS, 2013).

Pneumonia is one of the leading causes of hospitalization for Americans 65 and over and costs roughly \$10 billion in aggregate costs (Lindenauer et al., 2012). It is a common condition in the elderly with a substantial range in payments due to different practice patterns. Furthermore, because 30-day all-cause mortality and readmission measures for pneumonia are already publicly reported, pneumonia serves as a model condition for assessing relative value for an episode of care that begins with an acute hospitalization. By focusing on one specific condition, value assessments may provide actionable feedback to CMS and hospitals to incentivize targeted improvements in care.

Evidence for Rationale

Centers for Medicare & Medicaid Services (CMS). Bundled payments for Care Improvement (BPCI) Initiative fact sheet. [internet]. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2013 Aug

Lindenauer PK, Lagu T, Shieh MS, Pekow PS, Rothberg MB. Association of diagnostic coding with trends in hospitalizations and mortality of patients with pneumonia, 2003-2009. JAMA. 2012 Apr 4;307(13):1405-13. [PubMed](#)

The Boards of Trustees, Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust. The 2013 annual report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2013. 274 p.

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research & Evaluation (CORE). Hospital-level, risk-standardized payment associated with a 30-day episode of care for pneumonia (version 1.0): 2013 measure methodology report. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2013 Sep. 74 p. [19 references]

Primary Health Components

Pneumonia; sepsis; 30-day episode of care payment

Denominator Description

The measure cohort includes acute inpatient admissions for Medicare Fee-for-Service (FFS) beneficiaries aged 65 years or older discharged from non-federal acute care hospitals and critical access hospitals with either a principal discharge diagnosis of pneumonia or a principal discharge diagnosis of sepsis (not including severe sepsis) that have a secondary discharge diagnosis of pneumonia coded as present on admission (POA) and no secondary diagnosis of severe sepsis coded as POA.

The risk-standardized payment (RSP) is calculated as the ratio of the "predicted" payment to the "expected" payment at a given hospital, multiplied by the national mean payment. For each hospital, the denominator is the payment expected based on the nation and the specific hospital's case mix.

See the related "Denominator Inclusions/Exclusions" field.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the measure cohort.

See the [2017 Measure Updates and Specifications Report: Hospital-level Risk-standardized Payment Measures](#) for more details.

Numerator Description

The measure reports total payments associated with an episode of care for pneumonia.

The risk-standardized payment (RSP) is calculated as the ratio of the "predicted" payment to the "expected" payment at a given hospital, multiplied by the national mean payment. For each hospital, the numerator of the ratio is the payment predicted based on the specific hospital and its observed case mix.

See the related "Numerator Inclusions/Exclusions" field.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the outcome.

See the [2017 Measures Updates and Specifications Report: Hospital-level Risk-standardized Payment Measures](#) for more details.

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Additional Information Supporting Need for the Measure

Pneumonia is a common condition in the elderly with substantial variability in payments due to different practice patterns. Quality measures for pneumonia such as 30-day pneumonia risk-standardized mortality rate (RSMR) are already publicly reported. In the context of its publicly reported quality measures, pneumonia is an ideal condition in which to assess payments for Medicare patients and relative hospital value. Therefore, we created a measure of payments for a 30-day episode of care for pneumonia that could be aligned with the Centers for Medicare & Medicaid's (CMS's) 30-day pneumonia mortality and readmission measures. This will allow CMS to assess the value of care provided for these episodes.

A preliminary examination of the 30-day pneumonia risk-standardized mortality and risk-standardized payment measures showed high quality care (as measured by RSMR) at higher and lower relative costs. This finding illustrated that quality care can be provided at relative lower costs and that efficiencies of care can be optimized for pneumonia.

Evidence for Additional Information Supporting Need for the Measure

DeBuhr J. (Research Associate II, Yale University Center for Outcomes Research and Evaluation (CORE), New Haven, CT). Personal communication. 2017 Dec 12. 1 p.

Extent of Measure Testing

Assessment of Updated Models

The pneumonia payment measures estimate hospital-specific episode-of-care risk-standardized payment (RSPs) using a hierarchical generalized linear model. Refer to Section 2 in the original measure documentation for a summary of the measure methodology and model risk-adjustment variables. Refer to prior methodology and technical reports for further details.

The Centers for Medicare & Medicaid Services (CMS) evaluated and validated the performance of the pneumonia model using July 2013 to June 2016 data for the 2017 reporting period. They also evaluated the stability of the risk-adjustment model over the three-year measurement period by examining the model variable frequencies, model coefficients, and the performance of the risk-adjustment model in each year.

CMS assessed generalized linear model performance in terms of discriminant ability for each year of data and for the three-year combined period. Two summary statistics for assessing model performance were computed: the predictive ratio and a quasi- R^2 . For a traditional linear model (that is, ordinary least squares regression), R^2 is interpreted as the amount of variation in the observed outcome that is explained by the predictor variables (patient-level risk factors). Generalized linear models, however, do not output an R^2 that is akin to the R^2 of a traditional linear model. A "quasi- R^2 " was produced by regressing the total payment outcome on the predicted outcome. Specifically, CMS regressed the total payment on the payment predicted by the patient-level risk factors.

The results of these analyses are presented in Section 4.4 of the original measure documentation.

Pneumonia Payment 2017 Model Results

Frequency of Pneumonia Model Variables

CMS examined the change in frequencies of clinical and demographic variables. Frequencies of model variables were stable over the measurement period. The largest changes in the frequencies (those greater than 2% absolute change) include:

- Increases in Septicemia, sepsis, systemic inflammatory response syndrome/shock (12.6% to 14.9%), Respiratory arrest/cardiorespiratory failure/respirator dependence (24.1% to 26.3%), Asthma (11.1% to 14.2%), and Viral and unspecified pneumonia, pleurisy (50.2% to 52.3%)
- A decrease in Iron deficiency or other/unspecified anemias and blood disease (60.1% to 57.9%)

Pneumonia Model Parameters and Performance

Table 4.4.2 in the original measure documentation shows the hierarchical generalized linear regression model variable coefficients and 95% confidence intervals for the pneumonia payment model by individual year and for the combined three-year dataset. The pneumonia payment model coefficients can be directly interpreted as dollars. The quasi- R^2 for the pneumonia payment model was 0.08, suggesting that approximately 8% of the variation in payment can be explained by patient-level risk factors. This quasi-

R² is in line with R²s from other patient-level risk-adjustment models for healthcare payment (Pope et al., 2011).

Overall, the variable effect sizes were relatively constant across years. In addition, model performance was stable over the three-year time period; the quasi-R² and predictive ratios remained similar to the model used for 2016 public reporting.

Refer to the original measure documentation for additional information.

Evidence for Extent of Measure Testing

Pope G, Kautter J, Ingber M, Freeman S, Sekar R, Newhard C. Evaluation of the CMS-HCC risk adjustment model: final report. Research Triangle Park (NC): RTI International; 2011 Mar. 119 p.

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 measure updates and specifications report: hospital-level risk-standardized payment measures. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017 Mar. 94 p.

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Hospital Inpatient

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Single Health Care Delivery or Public Health Organizations

Statement of Acceptable Minimum Sample Size

Specified

Target Population Age

Age greater than or equal to 65 years

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Aim

Affordable Care

National Quality Strategy Priority

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Not within an IOM Care Need

IOM Domain

Not within an IOM Domain

Data Collection for the Measure

Case Finding Period

Discharges July 1, 2013 through June 30, 2016

Denominator Sampling Frame

Patients associated with provider

Denominator (Index) Event or Characteristic

Clinical Condition

Institutionalization

Patient/Individual (Consumer) Characteristic

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions

An *index admission* is the hospitalization that begins the episode-of-care payment window and includes admissions for patients:

Having a principal discharge diagnosis of:

Pneumonia (including aspiration pneumonia)*; or,

Sepsis (not including severe sepsis) with a secondary diagnosis of pneumonia (including aspiration pneumonia) coded as present on admission (POA) and no secondary diagnosis of severe sepsis coded as POA**

Enrolled in Medicare Fee-for-Service (FFS) Part A and Part B for the 12 months prior to the date of the admission, and enrolled in Part A and Part B during the index admission

Aged 65 or over

Not transferred from another acute care facility

*International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) codes used to define the pneumonia cohort for discharges on or after October 1, 2015:

A48.1 Legionnaires' disease
J10.00 Influenza due to other identified influenza virus with unspecified type of pneumonia
J10.01 Influenza due to other identified influenza virus with the same other identified influenza virus pneumonia
J10.08 Influenza due to other identified influenza virus with other specified pneumonia
J11.00 Influenza due to unidentified influenza virus with unspecified type of pneumonia
J11.08 Influenza due to unidentified influenza virus with specified pneumonia
J12.0 Adenoviral pneumonia
J12.1 Respiratory syncytial virus pneumonia
J12.2 Parainfluenza virus pneumonia
J12.3 Human metapneumovirus pneumonia
J12.81 Pneumonia due to SARS-associated coronavirus
J12.89 Other viral pneumonia
J12.9 Viral pneumonia, unspecified
J13 Pneumonia due to Streptococcus pneumoniae
J14 Pneumonia due to Hemophilus influenzae
J15.0 Pneumonia due to Klebsiella pneumoniae
J15.1 Pneumonia due to Pseudomonas
J15.20 Pneumonia due to staphylococcus, unspecified
J15.211 Pneumonia due to Methicillin susceptible Staphylococcus aureus
J15.212 Pneumonia due to Methicillin resistant Staphylococcus aureus
J15.29 Pneumonia due to other staphylococcus
J15.3 Pneumonia due to streptococcus, group B
J15.4 Pneumonia due to other streptococci
J15.5 Pneumonia due to Escherichia coli
J15.6 Pneumonia due to other aerobic Gram-negative bacteria
J15.7 Pneumonia due to Mycoplasma pneumoniae
J15.8 Pneumonia due to other specified bacteria
J15.9 Unspecified bacterial pneumonia
J16.0 Chlamydial pneumonia
J16.8 Pneumonia due to other specified infectious organisms
J18.0 Bronchopneumonia, unspecified organism
J18.1 Lobar pneumonia, unspecified organism
J18.8 Other pneumonia, unspecified organism
J18.9 Pneumonia, unspecified organism
J69.0 Pneumonitis due to inhalation of food and vomit

**Principal discharge diagnosis codes included in cohort if combined with a secondary diagnosis of pneumonia coded as POA AND no secondary diagnosis of severe sepsis (R65.20 Severe sepsis without septic shock or R65.21 Severe sepsis with septic shock) coded as POA is present:

A02.1 Salmonella sepsis
A22.7 Anthrax sepsis
A26.7 Erysipelothrix sepsis
A32.7 Listerial sepsis
A40.0 Sepsis due to streptococcus, group A
A40.1 Sepsis due to streptococcus, group B
A40.3 Sepsis due to Streptococcus pneumoniae
A40.8 Other streptococcal sepsis
A40.9 Streptococcal sepsis, unspecified

A41.01 Sepsis due to Methicillin susceptible Staphylococcus aureus
A41.02 Sepsis due to Methicillin resistant Staphylococcus aureus
A41.1 Sepsis due to other specified staphylococcus
A41.2 Sepsis due to unspecified staphylococcus
A41.3 Sepsis due to Hemophilus influenzae
A41.4 Sepsis due to anaerobes
A41.50 Gram-negative sepsis, unspecified
A41.51 Sepsis due to Escherichia coli [E. coli]
A41.52 Sepsis due to Pseudomonas
A41.53 Sepsis due to Serratia
A41.59 Other Gram-negative sepsis
A41.81 Sepsis due to Enterococcus
A41.89 Other specified sepsis
A41.9 Sepsis, unspecified organism
A42.7 Actinomycotic sepsis
A54.86 Gonococcal sepsis
B37.7 Candidal sepsis

Note: International Classification of Diseases, Ninth Revision (ICD-9) code lists for discharges prior to October 1, 2015 can be found in the [2016 Measures Updates and Specifications Report: Hospital-level Risk-standardized Payment Measures](#) .

Exclusions

Discharged alive on the day of admission or the following day who were not transferred to another acute care facility

Inconsistent or unknown patient vital status or other unreliable demographic (age and gender) data

Incomplete administrative data in the 30 days following the start of the index admission if discharged alive

Enrolled in the Medicare hospice program any time in the 12 months prior to the index admission, including the first day of the index admission

Discharged against medical advice

Transferred to a federal hospital

Not matched to admission in the pneumonia mortality measure

Missing index diagnosis-related group (DRG) weight where provider received no payment

For patients with more than one eligible admission for pneumonia in a single year, only one index admission for that condition is randomly selected for inclusion in the cohort. Additional admissions within that year are excluded.

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions

The measure reports total payments associated with an episode of care for pneumonia.

The measure captures payments for Medicare patients across multiple care settings, services, and supplies (that is, inpatient, outpatient, skilled nursing facility [SNF], home health, hospice, physician/clinical laboratory/ambulance services, durable medical equipment, prosthetics/orthotics, and supplies).

The risk-standardized payment (RSP) is calculated as the ratio of the "predicted" payment to the "expected" payment at a given hospital, multiplied by the national mean payment. For each hospital, the numerator of the ratio is the payment predicted based on the specific hospital and its observed case mix.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the outcome.

See the [2017 Measures Updates and Specifications Report: Hospital-level Risk-standardized Payment Measures](#) for more details.

Exclusions

Payment adjustments unrelated to clinical care decisions are not considered in the measure outcome

Numerator Search Strategy

Institutionalization

Data Source

Administrative clinical data

Type of Health State

Does not apply to this measure

Instruments Used and/or Associated with the Measure

None

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Ratio

Interpretation of Score

Does not apply to this measure (i.e., there is no pre-defined preference for the measure score)

Allowance for Patient or Population Factors

not defined yet

Description of Allowance for Patient or Population Factors

Risk-Adjustment Variables

In order to account for differences in case mix among hospitals, the measure adjusts for variables (for example, age, comorbid disease, and indicators of patient frailty) that are clinically relevant and have relationships with the outcome. For each patient, risk-adjustment variables are obtained from inpatient, outpatient, and physician Medicare administrative claims data extending 12 months prior to, and including, the index admission.

The measure adjusts for case mix differences among hospitals based on the clinical status of the patient at the time of the index admission. Accordingly, only comorbidities that convey information about the patient at that time or in the 12 months prior, and not complications that arise during the course of the

hospitalization, are included in the risk adjustment.

The measure does not adjust for socioeconomic status (SES) because the association between SES and health outcomes can be due, in part, to differences in the quality of healthcare that groups of patients with varying SES receive. The intent is for the measure to adjust for patient demographic and clinical characteristics while illuminating important payment differences. As part of the National Quality Forum's (NQF's) endorsement process for this measure, the Centers for Medicare & Medicaid Services (CMS) completed analyses for the two-year Sociodemographic Trial Period. Although bivariate analyses found that the average total payments is higher for dual-eligible patients (for patients living in lower Agency for Healthcare Research and Quality [AHRQ] SES Index census block groups) and African-American patients compared with all other patients, analyses in the context of a multivariable model demonstrated that the effect size of these variables was small, and that the quasi-R² values for the models are similar with and without the addition of these variables.

Refer to Appendix D in the original measure documentation for the list of comorbidity risk-adjustment variables and list of complications that are excluded from risk adjustment if they occur only during the index admission.

Standard of Comparison

not defined yet

Identifying Information

Original Title

Hospital-level RSP associated with a 30-day episode of care for pneumonia.

Measure Collection Name

National Hospital Inpatient Quality Measures

Measure Set Name

Payment Measures

Submitter

Centers for Medicare & Medicaid Services - Federal Government Agency [U.S.]

Developer

Centers for Medicare & Medicaid Services - Federal Government Agency [U.S.]

Yale-New Haven Health Services Corporation/Center for Outcomes Research and Evaluation under contract to Centers for Medicare & Medicaid Services - Academic Affiliated Research Institute

Funding Source(s)

Centers for Medicare & Medicaid Services

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This measure was developed by a team of experts:

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Financial Disclosures/Other Potential Conflicts of Interest

Unspecified

Endorser

National Quality Forum - None

NQF Number

not defined yet

Date of Endorsement

2016 Nov 7

Measure Initiative(s)

Hospital Compare

Hospital Inpatient Quality Reporting Program

Adaptation

This measure was not adapted from other source.

Date of Most Current Version in NQMC

2017 Mar

Measure Maintenance

Annual

Date of Next Anticipated Revision

2018 Apr

Measure Status

This is the current release of the measure.

This measure updates a previous version: Specifications manual for national hospital inpatient quality measures, version 5.0b. Centers for Medicare & Medicaid Services (CMS), The Joint Commission; Effective 2015 Oct 1. various p.

Measure Availability

Source available from the [QualityNet Web site](#) .

Check the QualityNet Web site regularly for the most recent version of the specifications manual and for the applicable dates of discharge.

Companion Documents

The following are available:

Hospital compare: a quality tool provided by Medicare. [internet]. Washington (DC): U.S. Department of Health and Human Services; [accessed 2017 Nov 10]. Available from the [Medicare Web site](#)

.

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 Medicare hospital quality chartbook. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017. Available from the [CMS Web site](#) .

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 payment measures updates and specifications report: supplemental ICD-10

code lists for use with claims for discharges on or after October 1, 2015. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017. Available from the [QualityNet Web site](#)

NQMC Status

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Copyright Statement

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Production

Source(s)

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